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Spout Seal for Combipacks

[0001] The present invention relates to a spout seal for combipacks. These are mainly intended for packs in the shape of such combipacks made of foil-coated paper containing liquids, for example milk, fruit juices, various kinds of non-alcoholic beverages or generally liquids also in the non-food sector. However, the seal may also be used for combipacks containing free-flowing goods such as sugar, semolina, or various kinds of chemicals. The foil-coated paper consists of a laminate material, for example of a paper or carton layer coated with a plastic material, for example polyethylene, and/or aluminum. The common volumes of such packs range from 20 cl up to 2 liters and more. A hole is punched out of the combipack at the position of the clearance opening of the seal to be fused on, which matches the clearance opening of the seal, which is subsequently sealed with a sealing foil.

[0002] There are various designs of spout seals made of plastic to be fused onto combipacks prepared in such a way. They form a bottom part, which is fused onto the combipack and a swivel lid piece attached thereto with a hinge. The bottom part has a circular lip that projects upwards around the clearance opening of the seal. This lip forms a spout at the front side of this bottom part. The lid hinged to the back of the bottom part has a downward-bulging shape. When the lid is closed, this fits into the inside of the lip of the bottom part and snaps into place there so that the spout is sealed. Upon first opening, and thus swinging the lid open for the first time, the sealing foil, which is located beneath the bottom part and covers the

punched-out hole in the combipack, becomes visible on the inside of the upward-projecting lip of the bottom part. Outside the hole, the bottom part of the spout seal is fused onto the combipack with its plane bottom side. This means that, by default, the combipack is punched out in the place where the inside of the lip of the bottom part of the seal lies, and a sealing foil covers this section. The sealing foil may consist of an aluminum foil, which is glued together with the carton layer of the pack on the inside of the combipack. However, it may also consist of a PE coating, which is fused onto the inside of the carton material of the pack by means of high-frequency welding so that it covers the punched-out section onto which the spout seal is fused at a later stage. When the seal is opened for the first time by swinging its lid open, the sealing foil – an aluminum or a PE foil – becomes visible on the inside of the upward-projecting lip of the bottom part of the seal. The user then punches this foil in with a finger, which subsequently allows pouring out the content of the combipack through the spout formed by the protruding lip via its spout shape at the front.

[0003] These conventional spout seals have several disadvantages. First of all, the pouring spout of the seals often does not have a very advantageous shape so that liquid runs down on the outside of the spout and down the combipack after pouring due to capillary effects. This spilling of the spout is very annoying, because often the entire front side of the combipack becomes soiled. In addition, another disadvantage of conventional solutions is that the seal has to be opened separately with a finger by pressing in the sealing foil after initially swinging the lid open. However, this method of opening the sealing foil is unhygienic. Moreover, the sealing foil is often not cleanly and entirely removed from the clear space inside the projecting lip. On the contrary, the sealing foil is torn open somewhere in its center section and then not properly pressed downwards into the inside of the combipack. This results in frayed edges on both sides, which protrude into the inside of the combipack and hamper and limit the free and clean flow of the content when pouring. If the combipack is tilted too much into the pouring direction, the mostly too small dimensions of the opening of the bottom part do not let enough air flow into the inside of the combipack. This leads to unwanted bubbling, meaning unsteady pouring in surges, which impedes targeted dosing

into a glass or cup. In addition, the lid of many conventional seals is not reliably supported when the lid is open so that the lid slowly swings shut again due to material tension in the hinge section and hampers the pouring flow, unless one purposely keeps the lid part open with one hand, which is tedious. In many cases, one hand is needed to hold the combipack and pour while the other holds a glass, for example, into which the content is to be poured. This does not leave one hand free to hold the lid open. In addition, conventional spout seals have few user-friendly guarantee features, which are supposed to guarantee the initial opening, i.e. the initial swinging up of the seal top. With some solutions, a guarantee tape has to be tom off, which has to be grabbed with two fingers. This is often difficult in practice. For example, when the user has applied hand cream or sunscreen, it will be difficult for him to tear off the guarantee tape as long as his hands are greasy. Opening the seal with gloves is even less possible. And finally, re-closing is also not satisfactory because the seals are not sufficiently tight after closing the lid.

[0004] Therefore, these problems need to be resolved and a spout seal must be designed for combipacks that firstly enables the absolutely hygienic, clean and complete removal of the sealing foil covering the clearance width of the spout, and which afterwards enables bubble-free and continuous pouring with a thicker jet of liquid. Secondly, the spout seal should also have a safe initial opening guarantee in a special embodiment, while still allowing easy initial opening of the seal. In a special embodiment, it is also supposed to ensure that the lid is supported reliably and kept in its open or closed position. In another special embodiment, it is also supposed to ensure pouring without sucking the pouring stream on the outside of the pouring spout. Finally, it shall enable tight re-closing after use.

[0005] The main function is fulfilled by a spout seal for combipacks consisting of a bottom part whose plane bottom side is to be fused onto a combipack. It has a circular, upward-projecting overhang to form a pouring spout whose inside is open, as well as a lid to be swiveled via a hinge attached to this bottom part for opening and sealing the bottom part. This pouring spout seal is distinguished by the lid forming a molding when open, which bulges upwards on the lid and forms a level top face that, when closed, form-fits into the clearance opening surrounded by the

projecting edge in the bottom side of the bottom part and lies flush with this bottom side or only protrudes downwards from the bottom side by up to 0.5 mm.

[0006] The other, secondary functions are fulfilled by special embodiments of the pouring spout seal, which are described in the related patent claims.

[0007] The figures show different views of an advantageous embodiment of this pouring spout seal for combipacks, which fulfills all required functions. By means of these figures, the pouring spout seal is described in detail in the following section and its function described and explained.

Figure 1: Shows the open spout lid in a perspective projection with the lid in the front and the pertinent bottom part behind the lid.

Figure 2: Shows the open spout lid in a perspective projection with the bottom part in the front and the pertinent lid behind the bottom part.

Figure 3: Shows the closed spout lid in a perspective projection in an oblique view from the back onto the hinge.

Figure 4: Shows the closed spout lid in a perspective projection in an oblique view from the front onto the pouring spout.

Figure 5: Shows the open spout lid in a view from the top with a drawn in line of intersection A-A.

Figure 6: Shows the open spout lid seen from the side in a sectional view along the line A-A inserted in figure 5.

Figure 7: Shows the open spout lid in a position rotated by 180° compared to the view in Figure 6, seen from the side.

Figure 8: Shows the open spout lid seen from the bottom.

[0008] Figure 1 shows the spout lid in a perspective view. The lid 1 is in the front and the bottom part 2 behind it. This bottom part 2 consists of a level disk 3 onto which an upward-projecting overhang 11 with lip 4 is molded. On the front side of this bottom part 2, which points to the back in this drawing, this is shaped into a pouring spout 5 and therefore has a wall 6, which runs at an oblique angle to disk 3. The overhang 11 rises with its lip 4 with reference to its height opposite disk 3 from the side of the hinge and this continues across section 7, whereby the lip 4 in the front section 8, which forms the spout, then runs level resp. parallel to disk 3. Therefore, the lip 4 is higher in the section 8 of the spout 5 than in the other section 7. The overhang 11 encloses a clearance opening 9 at the height of disk 3, which has the shape of a zero here and has been taken out of disk 3. The inner rim of this opening 9 is advantageously serrated and the teeth protrude downwards as shown below the figure in the enlarged illustration of a section drawn into the figure. The teeth 39 are made of by triangles, which form the vertical or slightly inclined front sides of delta profiles aligned on the bottom side of disk 3 and which protrude outwards from the opening 9. These delta profiles taper towards the back and merge into the level disk 3. They could be aligned in such a way on the bottom side of disk 3 that the bottom tips of the teeth 39 lie flush with the bottom side of disk 3 or that these teeth instead slightly protrude downward from the bottom side of the level disk 3. These teeth form effective tear-open aids with the sharp front edges of the respective delta profile and their downward-projecting tips, which becomes clear in the subsequent description of the seal's function. Close to opening 9 and running parallel to its edge, the bottom edge section of the overhang 11 is equipped with a bulge 32 on its inside. The front lip 10 of the pouring spout 5 is has a particularly sharp shape due to the level and horizontal top lip 4 of the overhang 11 merging with the external wall of the overhang 11 at an acute angle, as shown in other views. This measure ensures that no liquid is sucked up by the outside of spout 5 when pouring, due to its capillarity and the adhesive effect of the plastic material, and runs down the outside of the spout. To the left and the right of overhang 11, one square indentation 12 each is taken out of the top side of disk 3, whose function is demonstrated later on. On the back side of the bottom part 2 facing the observer,

one cam 13 each is molded, which protrudes vertically upwards from disk 3 and has a semi-cylindrical end 14 on top. Between this at the back end of bottom part 2, a rectangular indentation 15 is countersunk into the top side of disk 3, whose rear edge is protruded by a lip 16. This lip's outer edge forms a film hinge 17 with another lip 18, which is connected with an L-shaped swivel elbow 19. This swivel elbow 19 is swivel-mounted to lid 1 with its other end via a film hinge 27. Because of the L-shape of the swivel elbow 19, the lid 1 is at a lower level in the open position shown here, in which the pouring spout is molded, than disk 3 of bottom part 2. If the lid 1 is swiveled onto bottom part 2 from the position indicated here around the hinge axis formed by the first film hinge 17, the swivel elbow 19 lies flush in the rectangular indentation 15. After the seal is injection-molded of plastic in the open position shown here, the swivel elbow is firmly fused with this indentation 15 after the joining of both parts 1 and 2. For easier fusing, the leg of the swivel elbow 19 can receive a groove 29, which serves as additional fusing material. This groove 29 can also have an S-shape or several adjoining grooves can be aligned to form fusable material in order to generate a connection capable of withstanding tensile forces. The film hinge 17 only serves for the initial and one-off closing of the seal in the production phase. For subsequent repeat opening via another film hinge, lid 1 can be swiveled via another film hinge away from and towards the bottom part 2, namely the film hinge 27, to which it is connected by the L-shaped swivel elbow 19. The lid part 1, which is visible from the bottom here because it is swiveled away from the bottom part 2, also includes, like bottom part 2, a level disk 20, which is however a bit narrower than disk 3. From this disk 20, an upward protruding tub-shaped bulge 21 that projects upwards with side walls 31, which essentially run perpendicular to disk 20, is shaped. This bulge 21 has such a height adapted to the respective height of the overhang 1 at the bottom part 2 that when this bulge 21 swivels into the clearance opening 9 of the overhang 11, its top side runs parallel to the bottom side of bottom part 1. A collar 33 is molded onto the side wall of the bulge 21 near to its upward protruding lip and runs parallel to the same. When closing lid 1 onto bottom part 2, this collar 33 snaps into the inner edge of overhang 11 below collar 32 and thus seals the two parts 1 and 2. Grooves 28 can be applied to the bottom side of the tub-shaped bulge 21, which are intended for easier fusing of bulge 21 with the sealing foil of

the combipack to be equipped with the seal. These grooves 28 contribute additional material that is melted on for fusing. They may also have a different shape for this purpose and may extend over the entire bottom side of bulge 21. On the front of the bulge 21, disk 20 extends to a latch 22 in the front. This latch is connected by a triangular rib 23, which runs perpendicular to disk 20, with the outside of bulge 21 and thus reinforced. On both sides of the tub-shaped bulge, there are L-shaped wings 24 molded to the bottom side of disk 20. The shorter legs 25 of these wings 24 are dimensioned in such a way that when swiveling the lid 1 onto the bottom part 2, they fit into the square indentations 12 in its disk 3, with which they are fused after initial closing. As shown, the bottom sides of the legs 25 can be fitted with one groove 30 each or several grooves, which makes it easier to fuse them with the indentations 12. Also to be mentioned are the two latches 26 which run along the hinge side of the lid 1 in both directions towards the hinge. Due to the swivel geometry as a result of the alignment of the swivel axis 27 of the hinge on lid 1, which is active in operation, these latches 26 run over the semi-cylindrical top sides 14 of the cams 12 on the bottom part 2 when swinging open and close. The cams 13 on bottom part 2 have such a height that the latches 26 have to bend slightly for running over the cams. As a consequence, lid 1 is kept open, i.e. at least at an opening angle of approx. 90° in relation to the bottom part 2.

[0009] In figure 2, this spout seal is shown open (in the state in which it is molded) in a perspective view with the bottom part 2 in the foreground and the lid 1 behind it. In this view, one sees the pouring spout 5 and, more specifically, that it protrudes forward from the front edge of the level disk 3. Wall 35, which forms the pouring spout 5, has a channeled shape and extends to a sharp edge 10 at its end, so that this is drip-proof and no liquid is sucked onto the outside of wall 35 after pouring and runs down along the same. Once the swivel elbow 19 is fused with indentation 15 after the first and one-off closing of the seal after its production by means of injection molding, the elastic latches 26 interact with the cams 13 by running over their semi-cylindrical top sides 14 when the lid 1 is swiveled open from the bottom part 2 and closed again onto it around the axis of film hinge 27. The two wings 24 on lid 1 are fused with the indentations 12 on disk 3 of bottom

part 1 of the seal with their legs 25 when the seal is swiveled shut for the first and only time after its production by means of injection molding. For fusing, the grooves 30 contribute additional melt-on material. Afterwards, the thin spots 36 on these wings 24 act as breaking points and thus form guarantee features. If the seal, which was closed in the factory, with lid 1 fused with bottom part 2 in the above-described way is opened for the first time by the customer, lid 1 must be swiveled open by breaking these thin spots 36 while all three fusings remain intact and therefore film hinge 27 becomes effective for opening and closing lid 1.

[0010] Figure 3 shows the closed spout lid in a perspective projection in an oblique view from the back onto the closed hinge. Lid 1 is swiveled onto bottom part 2 here and fused with this in three places. On the one hand, the lying leg of the swivel elbow 19 on lid 1 is fused with the indentation 15 on disk 3 of the bottom part 2. On the other hand, the legs 25 of the two wings 24 are fused with the indentations 12 in disk 3 of the bottom part 2. In this condition, the spout seal is ready to be fused onto a combipack, whereby the entire bottom side 3 is fused or bonded with the outside of the combipack, and then the bottom side of the tub-shaped bulge 21 is either bonded with the outside of the pre-punched combipack or fused with the exposed sealing foil in the combipack material. The grooves 28 on the bottom side of bulge 21 serve for this fusion and contribute additional material that is fused on in the process, and then merges tightly with the sealing foil. In this position with the two parts 1 and 2 swiveled together, the top side of the tub-shaped bulge, which points downwards now and is not visible, is flush with or slightly deeper than the bottom side of disk 3. When it is flush with the bottom side of disk 3, it is intended to be glued onto the outside of the combipack, which is prepared for this purpose around this area with a sectional pre-punching of the carton. So the carton is punched throughout in the section covered by the bulge, so that a punched-out carton disk is formed, which still remains in its position though and is still tightly connected with the continuous sealing foil, which runs underneath the carton. When lid 1 is then swiveled upwards, this pre-punched carton disk is torn along and tears along the sealing foil fused to it in the punched out section. Especially if the edge of opening 9 is equipped with small sharp teeth 39, a defined hole is reliably torn out of the sealing foil, which creates a clean hole

for pouring. In the other case, where the bulge slightly protrudes downward from the bottom side of disk 3, it is intended to lie at the sealing foil exposed by previously punching out the carton, with which it is then fused directly. Grooves 28 serve for this purpose as already mentioned. When first swiveling up the lid 1, the sealing foil is then cleanly torn out in the entire area of the pouring hole 9 in bottom part 2. The effective swivel hinge between lid 1 and bottom part 2 is the one around the hinge axis 27 drawn in as a broken line. To open the lid, one finger is to be used to grab under latch 22 on lid 1 so as to swivel the lid upward. The two markings 37 show the user on which side he has to grab the lid 1 for opening and pull it upwards. When first opening the seal, the thin spots 36 on the wings 24 have to be torn first. These thin spots 36 therefore act as guarantee features. If these are still intact, this guarantees that the seal has never been opened before. If one pulls up lid 1 by breaking these thin spots, its bulge takes along the carton disk bonded to it, or – in the other case – the sealing foil fused to it, and therefore cleanly tears the sealing foil out of the punched out section in the combipack, which completely opens the passage through opening 9 in bottom part 1. Further swiveling of lid 1 after tearing the thin spots 36 and dragging along the sealing foil then takes place around the hinge axis 27, and the two latches 26 are also swiveled around this axis 27 accordingly. In doing so, they touch the top semi-cylindrical ends 14 of the two cams 13, because these cams 13 protrude slightly into their swiveling ranges. When further swiveling up lid 1, the two latches 26 are bent elastically, so that their tips glide over the semi-cylindrical ends 14 of the cams 13, and when the lid part was swiveled by approx. 90°, the latches 26 jump back to their original position. In this position, they keep the lid 1 open and prevent it swiveling shut again on its own. The once opened spout seal therefore remains securely open and the combipack can be operated single-handedly for pouring. In order to close the seal, lid 1 merely has to be swiveled closed with sufficient force because the latches 26 again have to glide over the semi-cylindrical ends 14 of cams 13 with their tips under renewed elastic deformation and fall back into a strain-free position once they are past them, in which lid 1 is then completely swiveled down onto the bottom part 2, whereby the collar 33 on bulge 21 snaps into place and seals below collar 32 at the inside of the overhang 11.

[0011] Figure 4 shows the closed pouring seal in a perspective projection in an oblique view from the front. One can see how the pouring spout 5 protrudes the front side 34 of disk 3 of bottom part 2 and merges at a sharp angle with the lip 4 of the overhang 11. For added clarity, the course of lip 4 is also indicated in a broken line. In the front section 8, the top part of lid 1 runs parallel to disk 3; in the rear section 7, however, the top part of lid 1 inclines slightly starting from its hinge in relation to disk 3.

[0012] Figure 5 shows the open spout seal in a view seen from the top, whereby an intersection line A-A is additionally drawn in. In this view, it becomes clear that lid 1 is narrower than disk 3 of the bottom part 2 and that the legs 25 of the wings 24 slightly protrude this width.

[0013] Figure 6 displays the open spout seal in a sectional view along the line A-A shown in Figure 5. This Figure 6 shows that the lid 1 is, due to the swivel elbow 19, on a lower level than bottom part 2 in a position swiveled up by 180°, in which the entire spout seal is molded.

[0014] Figure 7 shows the open spout seal in a view rotated by 180° in relation to the illustration shown in Figure 6. Collar 33 at the outside of bulge 21 of lid 1 is clearly visible in this illustration. When closing lid 1 onto bottom part 2, this collar 33 snaps into place behind collar 32, which is not visible here, on the inside of overhang 11 of bottom part 2, so that the spout seal is tightly closed.

[0015] Figure 8 shows the open spout seal from below, i.e. seen from above in a position rotated by 180° lying on a surface. Later on, the bottom side of disk 3 is fused or bonded to the outside of a combipack. Here, the opening 9 in this disk 3 must come to lie on the section punched out down to the sealing foil in the packaging material. There is a marking 37 visible in the front part of disk 3, which is, however, only due to molding as the pouring spout 5 rises above disk 3 and the wall thickness of a molded part is limited.